

VIII. *Butterflies on the Nile.* By HERBERT MACE. Communicated by Dr. G. A. K. MARSHALL, F.E.S.

[Read March 1st, 1922.]

THE river Nile, apart from the human interest attached to it, because of the plentiful remains of ancient civilisation found on its banks, is particularly interesting to biologists, because it forms the only practical link between the Ethiopian and Palaearctic regions. All the country, including Lower Egypt, lying to the north of the great desert, contains a fauna of Palaearctic character, and there is such a small belt of fertile country bordering the river as it flows through the desert land that only very few forms of life belonging to the respective regions can here intermingle.

Some light is thrown on the manner in which the distribution of species has been brought about, by a study of the butterflies which have been taken by various collectors on the Nile during the last ten or twenty years, and a collection which I have just received from Mr. B. W. Whitfeild, a keen collector, who has been stationed at Khartoum for a year, is of very special interest, chiefly because, unlike those of other collectors, who have generally passed up the river and stayed only a brief time at certain points, the specimens have all been taken within a five-mile radius of Khartoum itself; and although it may be poor in comparison with what an even less thorough entomologist might make in richer parts of the tropics, the collection is much larger than any previously made by a single collector at that place.

All former records have been exhaustively summarised by Dr. Longstaff in a paper published in the Entomological Society's Transactions, June 13, 1913, and a comparison of the insects received from Mr. Whitfeild with those listed by Dr. Longstaff produces some extremely interesting results.

Dr. Longstaff divides the area with which he deals into five parts. Under the first, Lats. 16-14° N., which includes Khartoum, he enumerates 25 species, and under the other sections, each of which includes two degrees of latitude further south, he lists additional species to those in the

first section, the total number thus recorded on the White Nile being 75. This arrangement does not show at a glance the total number of species found in each section, and I have therefore made a fresh analysis of Dr. Longstaff's figures, which I tabulate below.

North Latitude.	Nymphalidae.	Lycaenidae.	Papilionidae.	Hesperidae.	Total.
South of 8	18	6	25	3	52
8-10	13	6	21	3	43
10-12	6	8	21	2	37
12-14	5	8	16	0	29
14-16	4	7	12	2	25

This arrangement shows clearly that the number of butterflies on the White Nile diminishes steadily as the river runs north, the species found in the highest latitude being less than half those of the sub-equatorial district. This is what one would naturally expect, for the upper portion of the river flows through swampy and more varied country, capable of supporting numerous plants, without which insect life cannot be abundant, while the lower portion is all dry desert, with little vegetation other than that immediately bordering the stream.

Mr. Whitfeild's collection comprises a total of 27 species, which I have listed below.

NYPHALIDAE.

- Danaus chrysippus.*
- " " var.
 alcippus.
- Pyrameis cardui.*
- Precis cebrene.*
- Hypolimnas misippus.*

LYCAENIDAE.

- Lampides baeticus.*
- Tarucus theophrastus.*
- Catachrysops eleusis.*
- Zizera lysimon.*

PAPILIONIDAE.

- Herpaenia eriphia* f. *lactei-*
pennis.
- Belenois severina.*
- " *mesentina.*
- Teracolus calais.*

PAPILIONIDAE (continued).

- Teracolus phisadia.*
- " *protomedia.*
- " *halimede* f. *acaste.*
- " *eupompe* f. *pseudac-*
caste.
- " *evippe.*
- " *ephyia.*
- " *evarne.*
- Catopsilia florella.*
- Terias senegalensis.*
- " *brigitta* (wet and dry
 season forms).
- Colias hyale* var. *marnoana.*
- Papilio demodocus.*

HESPERIDAE.

- Sarungesa eliminata.*
- Gegenes nostradamus.*
- Rhopalocampta forestan.*

The determinations have been made or checked by Captain Riley of the British Museum, whose kindness I gratefully acknowledge. I also have to thank Professor Poulton and Dr. Dixey for their services in settling the identity of a doubtful *Teracolus*.

A few notes concerning some of the above species may be worth recording, either as confirming or supplementing the observations of former collectors.

Danaus chrysippus. Comparatively few of the specimens collected belong to the typical form. Dr. Longstaff estimates that about half the individuals met in the district are of the *alcippus* form, using that term to describe all specimens with more or less white hind-wings. At least 80 per cent. of Mr. Whitfeild's specimens come under this head, but the gradation is very gentle and the majority appear to be about midway between the two extremes. One or two individuals are remarkable for having only white rings round the discal spots. It is worth noting in this connection, that the single female specimen of *Hypolimnas misippus* sent by Mr. Whitfeild mimics the typical *chrysippus*.

Form *dorippus* has not been taken by Mr. Whitfeild, and Dr. Longstaff records only one specimen from the district, so that it would appear not to be common there.

Lampides boeticus. Taken commonly. One extremely small male—22 mm.—is worth mentioning.

Colias hyale var. *marnoana* Rogenh. Found in abundance. Captain Riley tells me these Khartoum specimens have a very distinctive facies and might well be regarded as a local race.

Sarangesa eliminata. Dr. Longstaff says the only record of this species on the White Nile is that of the Swedish expedition, which took two males. The locality is not specified, but he places it under the 14–16 area. Mr. Whitfeild encountered the insect once only, finding a considerable number resting in a fox earth. This singular habitat seems to be general in the genus and has not been explained. I have asked Mr. Whitfeild to make a special effort to learn something further about them.

Only seven of the species recorded from this section of the river are missing from the present collection. In order to make the list complete, I give Dr. Longstaff's records for these.

Chilades trochilus Freyer. One at Khartoum, 1909.

Lycaenesthes otacilia Trimen. One at Soba (Blue Nile, ten miles from Khartoum).

Azanius ubaldus Cramer. Fairly common at Khartoum, 1909, 1912.

Calopieris eulimene Klug. One at Burri, Khartoum, and seven males at Soba, 1909. Six between Soba and Khartoum, 1912.

Teracolus chrysonome. A female near Mogran, Western side of Khartoum, 1909.

Teracolus दौरا. One male at Khartoum, 1909. One between Soba and Khartoum, 1912.

Teracolus liagore Klug. A very scarce butterfly. One at Ad Duwem (Lat. 14° N.), 1909. One at Soba, 1912.

There are nine species in the collection which are quite new to this district. These are—

<i>H. eriphia</i> .	Previously recorded not higher than Lat.	13° 16' N.
<i>B. severina</i> .	" " " " " "	11° 0' N.
<i>T. caluis</i> .	" " " " " "	13° 16' N.
<i>T. phisadia</i> .	" " " " " "	13° 22' N.
<i>T. evippe</i> .	" " " " " "	13° 22' N.
<i>T. evarne</i> .	" " " " " "	12° 37' N.
<i>T. senegalensis</i> .	" " " " " "	12° 45' N.
<i>T. brigitta</i> .	" " " " " "	9° 30' N.
<i>R. forestan</i> .	" " " " " "	10° 0' N.

It will be seen that there are six species which were previously known no further north than the 12–14 section, one from the 10–12 section, and two which have never previously been taken lower down the river than 10 degrees N. latitude.

The most striking feature of the collection is the presence of the two species of *Terias*, both of which Mr. Whitfield has taken quite freely at Khartoum, though the previous record for *senegalensis* is four degrees further south, while the most northerly appearance of *brigitta*, hitherto, was 9 degrees N. Lat. Both are extremely conspicuous insects, not likely to be overlooked by former collectors had they been present. Indeed, Mr. Whitfield tells me that they are extremely prominent in the lucerne fields by the river, which he finds the most favoured place in the district for butterflies, *Pieridae* in particular being almost confined to them. The great skipper *R. forestan*, a very typical Ethiopian species, of which Mr. Whitfield took only one specimen, had hitherto been found by only one collector, no less than six degrees further south.

Mr. Whitfeld's theory is that these new species have been brought down the river among the fodder which is constantly being imported. Khartoum is steadily developing and importations of this kind continually increase. He thinks that large numbers of insects in all stages come down the river in this way, and that the increasing area of cultivation makes it possible for many to establish themselves.

It seems a very reasonable conclusion, and is certainly supported by the general distribution of the insects as shown in the above table. Only 19 of the 75 species are found outside the Ethiopian Region, and of these only eight extend into the Palaearctic Region. Of these it may be said that about half are generally considered Ethiopian types and the other half Palaearctic, but in face of the distribution shown by the table, one is led to believe that the greater probability is that all of them originated in Africa and passed down the Nile Valley into the Palaearctic Region. Certainly not more than eight or ten of the whole number can be regarded as Palaearctic forms which have gone south, and it seems to me that the semi-artificial introduction which has taken place during the last few years is only an extension of the natural process by which species have been carried down the Nile and established at favourable points.